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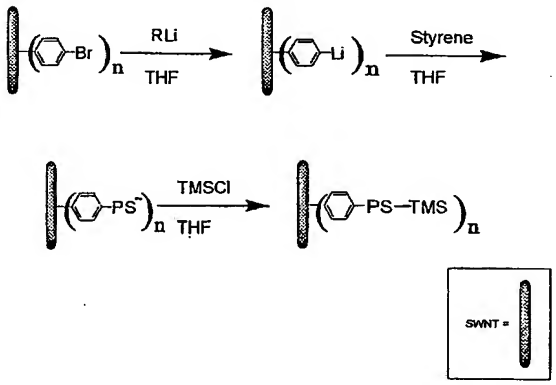
(54) Title: POLYMERIZATION INITIATED AT THE SIDEWALLS OF CARBON NANOTUBES



(57) Abstract: The present invention is directed to aryl halide (such as aryl bromide) functionalized carbon nanotubes can be utilized in anionic polymerization processes to form polymer-carbon nanotube materials with improved dispersion ability in polymer matrices. In this process the aryl halide is reacted with an alkyllithium species or is reacted with a metal to replace the aryl-bromine bond with an aryl-lithium or aryl-metal bond, respectively. It has further been discovered that other functionalized carbon nanotubes, after deprotonation with a deprotonation agent, can similarly be utilized in anionic polymerization processes to form polymer-carbon nanotube materials. Additionally or alternatively, a ring opening polymerization process can be performed. The resultant materials can be used by themselves due to their enhanced strength and reinforcement ability when compared to their unbound polymer analogs. Additionally, these materials can also be blended with pre-formed polymers to establish compatibility and enhanced dispersion of nanotubes in otherwise hard to disperse matrices resulting in significantly improved material properties. The resultant polymer-carbon nanotube materials can also be used in drug delivery processes due to their improved dispersion ability and biodegradability, and can also be used for scaffolding to promote cellular growth of tissue.

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